CLAIMS

1. A method for determining data rates for a plurality of data streams to be transmitted via a plurality of transmission channels in a multi-channel communication system, comprising:

determining a required signal-to-noise-and-interference ratio (SNR) for each of a plurality of data rates to be used for the plurality of data streams, wherein at least two of the data rates are unequal;

determining an effective SNR for each of the plurality of data streams based in part on successive interference cancellation processing at a receiver to recover the plurality of data streams;

comparing the required SNR for each data stream against the effective SNR for the data stream; and

determining whether or not the plurality of data rates are supported based on results of the comparing.

2. The method of claim 1, wherein the plurality of data streams are transmitted over a plurality of transmit antennas in a multiple-input multiple-output (MIMO) communication system.

3. The method of claim 2, wherein each data stream is transmitted over a respective transmit antenna, and wherein the effective SNR for each data stream is determined based on full transmit power being used for the data stream.

4. The method of claim 1, wherein the effective SNR for each data stream is further determined based on a received SNR indicative of an operating condition of the plurality of transmission channels.

5. The method of claim 4, wherein the received SNR is determined based on the required SNR for one of the plurality of data streams.

6. The method of claim 4, wherein the received SNR is specified for the communication system.

7. The method of claim 4, wherein the received SNR is estimated at the receiver.

8. The method of claim 4, wherein the successive interference cancellation processing recovers one data stream at each stage, and wherein the effective SNR for each recovered data stream is estimated as

$$\mathrm{SNR}_{\mathrm{eff}}(k) = \left(\frac{N_R - N_T + k}{N_T N_R}\right)\mathrm{SNR}_{\mathrm{rx}} \quad , \qquad \text{Eq (9)}$$

where $\mathrm{SNR}_{\mathrm{eff}}(k)$ is the effective SNR for the data stream recovered in stage k,

$\mathrm{SNR}_{\mathrm{rx}}$ is the received SNR,

N_T is the number of transmit antennas used for data transmission, and

N_R is the number of receive antennas.

9. The method of claim 4, further comprising:

evaluating a plurality of sets of data rates; and

selecting a rate set associated with a minimum received SNR for use for the plurality of data streams.

10. The method of claim 9, wherein the data rates in each rate set are selected to achieve a specified overall spectral efficiency.

11. The method of claim 1, wherein the required SNR for each data rate is determined based on a look-up table.

12. The method of claim 1, wherein the plurality of data rates are deemed to be supported if the required SNR for each data rate is less than or equal to the effective SNR for the data rate.

13. The method of claim 1, wherein the communication system implements orthogonal frequency division multiplexing (OFDM).

14. A method for determining data rates for a plurality of data streams to be transmitted over a plurality of transmit antennas in a multiple-input multiple-output (MIMO) communication system, comprising:

determining an operating signal-to-noise-and-interference ratio (SNR) indicative of an operating condition of the MIMO system;

determining a required SNR for each of a plurality of data rates to be used for the plurality of data streams, wherein at least two of the data rates are unequal and wherein the plurality of data rates are selected to achieve a specified overall spectral efficiency;

determining an effective SNR for each of the plurality of data streams based on the operating SNR and successive interference cancellation processing technique at a receiver to recover the plurality of data streams;

comparing the required SNR for each data stream against the effective SNR for the data stream; and

determining whether or not the plurality of data rates are supported based on results of the comparing.

15. A method for determining data rates for a plurality of data streams to be transmitted via a plurality of transmission channels in a multi-channel communication system, comprising:

determining a received SNR indicative of an operating condition of the plurality of transmission channels;

determining an effective SNR for each of the plurality of data streams based on the received SNR and successive interference cancellation processing at a receiver to recover the plurality of data streams; and

determining a data rate for each data stream based on the effective SNR for the data stream, wherein at least two of the data rates are unequal.

16. The method of claim 15, wherein the data rate for each data stream is determined such that a required SNR for the data stream is less than or equal to the effective SNR for the data stream.

17. The method of claim 15, wherein the received SNR is specified for the communication system.

18. The method of claim 15, wherein each data stream is transmitted over a respective transmit antenna in a multiple-input multiple-output (MIMO) communication system.

19. A memory communicatively coupled to a digital signal processing device (DSPD) capable of interpreting digital information to:

determine a required signal-to-noise-and-interference ratio (SNR) for each of a plurality of data rates to be used for a plurality of data streams to be transmitted via a plurality of transmission channels in a multi-channel communication system, wherein at least two of the data rates are unequal;

determine an effective SNR for each of the plurality of data streams based in part on successive interference cancellation processing at a receiver to recover the plurality of data streams;

compare the required SNR for each data stream against the effective SNR for the data stream; and

determine whether or not the plurality of data rates are supported based on results of the comparison.

20. An apparatus in a multi-channel communication system, comprising:

means for determining a required signal-to-noise-and-interference ratio (SNR) for each of a plurality of data rates to be used for a plurality of data streams to be transmitted via a plurality of transmission channels, wherein at least two of the data rates are unequal;

means for determining an effective SNR for each of the plurality of data streams based in part on successive interference cancellation processing at a receiver to recover the plurality of data streams;

means for comparing the required SNR for each data stream against the effective SNR for the data stream; and

means for determining whether or not the plurality of data rates are supported based on results of the comparing.

21. The apparatus of claim 20, further comprising:

means for evaluating a plurality of sets of data rates; and

means for selecting a rate set associated with a minimum received SNR for use for the plurality of data streams.

22. The apparatus of claim 20, wherein the multi-channel communication system is a multiple-input multiple-output (MIMO) communication system.

23. The apparatus of claim 22, wherein the MIMO system implements orthogonal frequency division multiplexing (OFDM).

24. A base station comprising the apparatus of claim 20.

25. A wireless terminal comprising the apparatus of claim 20.

26. A transmitter unit in a multiple-input multiple-output (MIMO) communication system, comprising:

a controller operative to determine a plurality of data rates for a plurality of data streams to be transmitted over a plurality of transmit antennas by

determining a required signal-to-noise-and-interference ratio (SNR) for each of the plurality of data rates, wherein at least two of the data rates are unequal,

determining an effective SNR for each of the plurality of data streams based in part on successive interference cancellation processing technique at a receiver to recover the plurality of data streams,

comparing the required SNR for each data stream against the effective SNR for the data stream, and

determining whether or not the plurality of data rates are supported based on results of the comparing;

a transmit (TX) data processor operative to process each data stream with the determined data rate to provide a respective symbol stream; and

one or more transmitters operative to process a plurality of symbol streams for the plurality of data streams to provide a plurality of modulated signals suitable for transmission over the plurality of transmit antennas.

27. The transmitter unit of claim 26, wherein the controller is further operative to determine the data rates for the plurality of data streams by

evaluating a plurality of sets of data rates, and

selecting a rate set associated with a minimum received SNR.

28. A base station comprising the transmitter unit of claim 26.

29. A wireless terminal comprising the transmitter unit of claim 26.

30. A transmitter apparatus in a multiple-input multiple-output (MIMO) communication system, comprising:

means for determining a required signal-to-noise-and-interference ratio (SNR) for each of a plurality of data rates to be used for a plurality of data streams to be transmitted over a plurality of transmit antennas in the MIMO system, wherein at least two of the data rates are unequal;

means for determining an effective SNR for each of the plurality of data streams based in part on successive interference cancellation processing at a receiver to recover the plurality of data streams;

means for comparing the required SNR for each data stream against the effective SNR for the data stream;

means for determining whether or not the plurality of data rates are supported based on results of the comparison;

means for processing each data stream to provide a respective symbol stream; and

means for processing a plurality of symbol streams for the plurality of data streams to provide a plurality of modulated signals suitable for transmission over the plurality of transmit antennas.

31. A receiver unit in a multiple-input multiple-output (MIMO) communication system, comprising:

a receive (RX) MIMO processor operative to receive and process a plurality of received symbol streams using successive interference cancellation processing to provide a plurality of detected symbol streams for a plurality of transmitted data

streams, one detected data stream for each stage of the successive interference cancellation processing; and

a RX data processor operative to process each detected symbol stream to provide a corresponding decoded data stream, and

wherein data rates for the plurality of transmitted data streams are determined by determining a received signal-to-noise-and-interference ratio (SNR) indicative of an operating condition of the communication system, determining an effective SNR for each of the plurality of data streams based on the received SNR and the successive interference cancellation processing, and determining the data rate for each data stream based on the effective SNR, and wherein at least two of the data rates are unequal.